Sol Small Computer Systems

Processor Technology

Your key to effective, economical computer power.

If you ever wished to gain the force of a powerful general purpose computer operating with the simplicity and ease of ordinary office equipment, you can.

Now a scant year after the early 1977 introduction of the Sol computer system, over 6,000 Sol's are on the job.

Their tasks are varied. Users all over the world are analyzing the stock market, tracking prescriptions, keeping the books, doing chemical, mathematical and physical research, controlling industrial processes, handling the payroll and profit and loss statements, correlating market research, analyzing product design and countless other tasks.

In a word, they are a working tool never before available to the average person or small business. They are saving time and earning money for lots of people like yourself. And they are doing all these things for a remarkably low investment!

Sol systems don't go out of date either. They were designed from the ground up to build on as newer memories, more powerful languages and more advanced peripheral equipment come along. As your needs for more computer force grow, no matter what Sol system you start with, you'll own a set-up beyond the dictates of the calendar. You'll know why you bought the best.

Processor Technology customers often tell us their original intent was to use a Sol small computer system at home or as a hobby. Sooner than you might believe, they were using the Sol system in their business, profession or education.

So by simply adding a disk memory system, the Helios II, a printer or other peripheral, perhaps putting one of several easy to learn languages to work, our users were solving routine, sometimes very complex, problems with amazing ease and speed. And solving them profitably.

Compare Sol to any other small computer

As the first totally integrated system in the small computer field, Sol has had imitators. None has matched Sol's high quality engineering and all around flexibility. No wonder it's the number one choice.

Notice the keyboard. Letters are positioned for standard touch typing. The key tops are contoured for comfort. When depressed, they respond with a resilient, springy touch. You can use the computer for hours without tiring. For extensive text editing, word processing, order entry, and similar continuous keyboard tasks, the Sol keyboard quality is unmatched.

Inside, the keyboard circuitry is non-contacting (capacitive). There are no contacts to wear out. If someone spills a drink into the works, simply sponge off the keyboard mechanism.

A sturdy metal cabinet protects Sol. A 200 pound person can stand on the top of it without damage. The wood sides are solid, hand-finished walnut.

Inside Sol, Processor Technology has taken some special pains. Engineers call the main motherboard "beautiful"— conservatively designed and rugged. No corners were cut.

Processor Technology paid particular attention to the video circuitry. Notice that the cursor block on the video screen (the spot that shows you where you are when entering text) surrounds the character completely leaving it still legible. All the characters on the screen are crisp and legible. They don't wobble or swim as you look at them. As you scroll the text up and down on the screen, the image moves smoothly without strobing or flashing. There's little eye fatigue from long time viewing.

Few wires are strung around on the main board. Connectors are mounted at the rear to plug in other electronic components, just like a hi-fi amplifier. No modifications are needed to plug in Teletype™ machines, cassette recorders, tv monitors, telephone couplers (modems), and ASCII standard terminals (EIA & current loop). You can hook up a Sol computer system as easily as a home stereo system.

™Teletype Corp.

S-100 bus compatibility

Significantly, Sol systems are compatible with other S-100 bus products. The S-100 bus is a standard connecting configuration used by more than 100 manufacturers of small computer equipment. Many of these products can be easily plugged inside a Sol system when you need special hardware for voice input, control of electrical appliances elsewhere in the building, analog to digital conversion, or video graphic capability.

Another important feature unique among microprocessor systems is Sol's flexibility. It can switch in a moment from a stand alone computer to an intelligent terminal. Many people have access to large computers via telephone hookup. You can use the Sol as a computer to develop your program and reduce the data. Then switch to terminal mode to use it as a time-sharing terminal with a large computer.

Easy to use, the Sol is ideal for learning. Adults find hours of intellectual challenge and stimulating involvement. Kids enjoy the Sol. They start with games but quickly pick up the elements of programming. Sol's rugged construction is kidproof so you don't have to worry.

All Sol systems come with excellent, understandable documentation. Schematics and instructions are geared to learning. You don't have to be an electronic engineer to understand them. Even if you purchase a Sol fully assembled and factory tested, Processor Technology's instruction manuals will help keep your Sol up and running. Sol is easier to service. You'll have less down time and lower maintenance costs.

Sol systems are backed by a factory warranty. Processor Technology guarantees assembled and tested products for one year (parts and labor). Kit products have a three month guarantee on parts. Any authorized Processor Technology dealer can service Sol systems, and many offer maintenance contracts.

Sol's flexible. Change operating software quickly and easily.

All system monitoring functions for Sol are controlled by preprogrammed ROM (Read Only Memory) chips located on a small personality module inside. You can change the Sol's "personality" in one minute. The transformation requires no technical skill at all. A secretary will find it easier than changing a typewriter ribbon.

There are now two personality modules. SOLOS gears the computer for stand alone operation. It automatically readies the computer for your commands as soon as the Sol is turned on and controls the cassette, keyboard and video operations. SOLOS has terminal mode functions to switch the computer between stand alone and terminal operation.

BOOTLOAD personality module works with our Helios II Disk Memory System. We've replaced the terminal mode functions with a special loading program for the Disk Operating System. In other respects it is identical to SOLOS.

Additional personality modules are in development.

Sol small computer systems with the add on power of $40,000 mini's.

The Sol-20/16 Terminal Computer.

The Sol-20/16, our basic computer, features the SOLOS personality module, 16,384 bytes of memory and BASIC/5 cassette plus a complete 300 page manual. It's available either fully assembled and factory tested or as a kit. A single, low power module carries the 16K dynamic memory.

BASIC/5 is a small version of the very versatile BASIC language. It is designed for applications requiring primarily mathematical manipulation without extensive processing of text. BASIC/5 is the perfect language for an introduction to computer programming because it's easy to learn and requires only a small amount of memory storage. Hundreds of published programs already written in BASIC work with Processor Technology's BASIC/5.

The 300 page Sol manual carries the most complete set of instructions, theory of operation, software information, drawings and operating information offered by any small computer manufacturer. And after you get it, we send you periodic updates. Many of our users also file their copies of ACCESS, the Sol users journal, in this handsome sturdy 3 ring binder.

You will need to add some device for storage and retrieval of data and programs. A standard cassette recorder will do this. Plug it directly into the back of the Sol. You will also need some means of visually displaying data — a tv monitor, teletype or similar device. These also plug into the back without special adaptors or modifications.

The Sol-20/16 offers the option of using equipment you have or selecting peripherals of your choice. It's an excellent low cost starting system, especially in kit form.

Here are a few of the features of the Sol-20/16.

- 8080 microprocessor, a sophisticated computer-on-a-chip and the "brains" of the Sol.
- 1024 character video circuitry which displays 16 lines of 64 characters on a video monitor or suitably adapted tv.
- a custom designed, comfortable to use 85-key capacitive (non-contacting) keyboard with cursor keys and arithmetic keypad.
- an audio cassette interface capable of controlling two recorders (one read, one write) at 1200 bits per second. Store and retrieve large amounts of data on low cost, standard cassettes.
- parallel and serial standard interfaces with connectors permit a teletype and many other devices to plug directly into the back of a Sol.
- a complete rugged power supply and quiet cooling fan.
- a handsome case of walnut and metal.
- 16,384 byte dynamic RAM module.
- software on cassette with BASIC/5 language and two sophisticated computer games.
- a back plane capable of accepting five expansion modules.

Sol-20/32 Terminal Computer

Sol-20/32 offers all the features of the Sol-20/16 with twice as much memory. A single low power module carries 32,768 bytes of dynamic random access memory. Four slots remain open in the back plane for hardware additions.

Fully configured Sol Systems.

Presently four fully integrated Sol Systems with all the hardware, peripheral equipment, documentation and software are available. Depending on the complexity of your tasks, one will give you the kind of computer power you need now and still let you add more later.

All offer the best price/performance value on the market today. All integrated systems come with Processor Technology's new Extended BASIC. This new language is one of the fastest and certainly the most complete for the personal small computer on the market today.

Extended BASIC

Extended Cassette BASIC features string and advanced file functions, special screen commands, timed input, complete matrix, logarithmic and trigonometric functions, exponential numbers, 8 digit precision, and advanced mathematical functions including log, natural log, sine, cosine, tangent, arc tangent and square root. Using this BASIC, you can do all of the mathematics needed to solve 5 equations with 5 unknowns in a matter of 4 seconds using just 2 lines of code.

Extended Cassette BASIC handles serial access files. It has provisions for tape rewind. Cursor control gives you some graphic abilities.

Extended Disk BASIC has all the number crunching talents of Extended Cassette BASIC plus almost instant access to data and programs on floppy disks. It has random as well as sequential files and a unique ability to update sequential data in place. It takes advantage of the powerful Processor Technology Disk Operating System and Helios II.

In sum, when you purchase a Sol system, you get real computer versatility. You can do the general ledger, the payroll, or engineering and scientific problems. You can display and print out the results. You can edit text. You can use it for computer aided instruction. You have computer power, not computer-like power.

Sol System I-A

Sol System I-A, offered in assembled form only, includes the Sol-20/16 Terminal Computer with 16,384-byte memory and SOLOS module plus PT-872 video monitor, RQ-413A cassette recorder, Extended Cassette BASIC, cables and the Sol system manual.

The PT-872 is a specially modified 11" Panasonic black and white TV set. It is switchable from the video display mode to the standard UHF/VHF television mode. Fully isolated for safety, these units provide extremely crisp and stable displays. The cassette recorder is a standard Panasonic unit.

Sol System II-A

Sol System II-A is exactly the same as Sol System I-A except for a larger memory, 32,768 bytes (eight bit words). The memory is contained on a single dynamic RAM module, using only one slot of the back plane. Sold fully assembled and tested, it includes the Sol-20/32 Terminal Computer with 32K of memory and SOLOS personality module plus PT-872 video monitor, RQ-413A cassette recorder, Extended Cassette BASIC, cables and Sol System manual.

For serious business, you need a disk.

Cassettes are the most convenient low cost way to store programs and data, but it takes time to wind and rewind the tape. For most business uses, the fast retrieval time of a disk is the way to go. With a Helios II Disk Memory System you can call up any file almost instantly – no waiting. The capabilities of Processor Technology's Disk Operating System (PTDOS) will impress you. Add to, delete or edit files. List, copy or combine the files on any disk. Give your files a special password to protect the data. This disk system outperforms any other small computer disk system on the market.

Sol System III

Here's the system that stands up to the mini's. It includes the Sol-20 with 49,152 bytes of memory and BOOTLOAD personality module, Helios II Model 2 Disk System with Extended Disk BASIC, PT-872 video monitor, cables and documentation.

Sol System III comes assembled, burned-in and tested. Inclusion of Helios II brings this system up to a level fully comparable and frequently superior to many mini-computer systems. And, you reach this operational level for thousands of dollars less than typical mini-computer installations. A separate brochure on the Helios II and PTDOS is available on request.

Newest member of the Sol family, Sol System IV

Sol System IV consists of the Sol-20 with 49,152 bytes of memory and BOOTLOAD personality module, Helios II Model 4 Disk System with two dual drives, Extended Disk BASIC, PT-872 video monitor, cables and Sol System manual.

It comes completely assembled, tested and burned-in. Except for the larger data storage capacity, 1.5 million bytes, it is like Sol System III. Obviously with so much memory available the scope of problems and the amount of data that can be manipulated become much greater. Suitable for larger business applications.

Software.

Languages on both cassette and disk include BASIC/5, Extended BASIC, FOCAL,™ FORTRAN* and PILOT.* ALS-8 is an "assembler" for program development which includes text editing and 8080 simulation. It is available either on cassette or on preprogrammed ROM (Read Only Memory) chips which mount on the Sol General Purpose Memory module. A variety of games and other special programs are also available.

Using one of these languages, you can program your Sol to perform a wide variety of tasks. Thousands of special programs have already been written in these languages. You will find many of them in readily available books and periodicals.

Processor Technology has devoted more effort to the development of software than any other small computer manufacturer. We are the first small computer company to offer a fully implemented disk operating system: PTDOS with over 40 major commands, several languages and numerous utilities. New programs are in development.

FOCAL

FOCAL is a math language originally written for the PDP-8 mini-computer. Many thousands of FOCAL programs exist and now can run in Sol. 8080 FOCAL includes "operator precedence" and all other standard FOCAL conventions. FOCAL is available on CUTS/SOLOS compatible cassette. It is also included on the PTDOS system disk that comes with Sol Systems III and IV.

™DEC
*available soon.

FORTRAN

FORTRAN is a high level language which includes the following functions:

- Explicit run time error comments during compilation and at run time
- Eight significant digits of precision
- String manipulation
- Cursor plot function
- Hexadecimal constants
- Direct in-line 8080 assembly language mnemonics accepted by the compiler.

Processor Technology FORTRAN is identical to FORTRAN IV except for the extensions and lack of COMMON and Double Precision statements. It is available on CUTS cassette or disk. The disk version interfaces well with PTDOS.

PILOT

Processor Technology PILOT, available in mid 1978, is offered on both disk and cassette.

PILOT is a string-oriented interactive language well suited to the applications of educators, educational institutions and psychologists. It is excellent for testing and computer aided instruction.

Custom tailored for Processor Technology by the creator Dr. John Starkweather of the University of California, PILOT runs on the Sol using the SOLOS I/O with direct screen cursor positioning, program and data files.

And for fun

8080 CHESS. Here's a wonderful way to improve your chess skills. Operating at a healthy level 5, the 8080 chess program is the finest available for microprocessor computers. Under development for several years, the program has already proved its mettle in competition against the truly big computers.

Offered in cassette form, and accompanied by a complete instruction manual, it gives education and delight to both the novice and the expert player.

TREK 80. Based on the NBC television series STARTREK, this machine language program uses 8K of memory for real time war with the Klingons. No holds barred, they're out to get you from each of 100 quadrants. You can warp through hyperspace, fire phasers, photon torpedos, or experimental rays. If you just can't go on, self-destruct.

GAMEPAC 1. Show off your Sol system with this line up of video games.

MATH PACK. Processor Technology floating Math Pack is a self contained five function calculator designed to run on any system using the 8080 code. The following functions are offered: addition, subtraction, multiplication, division and square root.

All Processor Technology software is distributed on an individual sale basis for personal use. No license to copy, duplicate or sell is granted with this sale. Each software package has been copyrighted.

See your Sol dealer for a demonstration.

Sol stores are located conveniently throughout the U.S. and Canada. Your Sol dealer has been carefully selected on the basis of his computer knowledge and ability to meet your needs. Not every store carries the Sol line. The dealers who do are the best in the world.

Sol Specifications

- Keyboard: 85 key upper/lower case with separate numeric keypad. Upper-case shift, shift-lock, cursor control and repeat keys provided. System reset performed by simultaneous depression of control keys. Indicator lights (LED) for local, upper case and shift.
- Character set: 96 printable ASCII upper and lower case characters plus 32 optionally displayable control characters.
- Cursor: Switch-selectable blinking. Block video inversion. Program controlled positioning standard. Cursors may exist at any or all character locations.
- CPU: 8080A. Uses same machine language as other 8080 systems. 2 MHz clock cycle time. 78 instructions.
- Cassette interface: 120 character per second CUTS format or 30 character per second Kansas City format, selected by software. Uses audio cassette function of microphone start-stop switches. AGC for level insensitivity. Phase-locked data recovery tracks with speed variations. Software performs CRC data integrity check each 256 characters.
- Serial interface: RS-232 and 20 mA current loop, 75 to 9600 baud, asynchronous. 25 pin female "D-type" connector on card.
- Parallel interface: Eight data bits for input and output; output bus is tristate for bidirectional interfaces; levels are standard TTI.25 pin male "D-type" connector on card.
- External memory: Expandable to 65,536 bytes total ROM, PROM, and RAM. Uses S-100 standard modules.
- Video signal output: 1.0 to 2.5 volts peak-to-peak. Nominal bandwidth is 7 MHz.
- Power requirements: 117 volts AC/60 Hertz, 250 Watts. 220 Volt/50 Hertz option available.

Sol SMALL COMPUTER SYSTEMS

	Sol-20/16	Sol-20/32	Sol System I-A	Sol System II-A	Sol System III	Sol System IV
Mainframe	Sol-20	Sol-20	Sol-20	Sol-20	Sol-20	Sol-20
Personality Module (Operating System)	SOLOS	SOLOS	SOLOS	SOLOS	BOOTLOAD & PTDOS	BOOTLOAD & PTDOS
Random Access Memory (RAM) (8-bit words)	16K bytes	32K bytes	16K bytes	32K bytes	48K bytes	48K bytes
Language Included	BASIC/5	BASIC/5	Extended Cassette BASIC	Extended Cassette BASIC	Extended Disk BASIC, FOCAL, BASIC/5	Extended Disk BASIC, FOCAL, BASIC/5
Video Monitor	—	—	PT-872	PT-872	PT-872	PT-872
Cassette Recorder	—	—	RQ-413A	RQ-413A	—	—
Disk Memory System	—	—	—	—	Helios II Model 2	Helios II Model 4
Available Disk Memory (8-bit words)	—	—	—	—	750K bytes	1500K bytes
Number of Disks On-line	—	—	—	—	2	4

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Sol Systems: Why they are first choice